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Emergence Cabinet for Mass Rearing of Boll Weevils



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Emergence Cabinet for Mass Rearing of Boll Weevils

By J. G. Griffin and O. H. Lindig¹

ABSTRACT

The cabinet holds trays of rearing medium during the emergence period. Newly emerged boll weevils are attracted by light into attached collecting cages. The cabinet accommodates 920 trays that normally produce 450,000 or more adult weevils. One person can handle the cabinet and collect the adults from the cage. Index terms: *Anthonomus grandis* Boheman, insect-rearing equipment.

INTRODUCTION

Rearing of boll weevils, *Anthonomus grandis* Boheman, in a laboratory requires a cabinet to hold the containers of larval rearing medium during the emergence period and a means of trapping and holding the adults as they emerge from the medium. Gast et al. (1966) described cabinets and techniques used for small cultures.

Later, Gast developed a larger cabinet to use as the level of production increased (unpublished data). However, these larger cabinets were too small and required too much labor when production reached several million weevils per week. When mass-rearing research was begun at the Robert T. Gast Rearing Laboratory, Mississippi State, Miss., emergence cabinets were needed to handle a production of 5 to 10 million weevils per week with a minimum of labor and emergence time but with a maximum yield of weevils. An emergence cabinet suitable for this level of production is described here.

EQUIPMENT

The emergence cabinet (fig. 1) is 24 inches wide by 60 inches high by 72 inches long. The cabinet frame is constructed of 2- by 2- by $\frac{1}{4}$ -inch metal angles and is covered on two sides and the top and bottom with 24-gage sheet metal spot-welded to the frame members (figs. 2 and 3). The shelf brackets, made of $\frac{3}{4}$ - by $\frac{3}{4}$ - by $\frac{1}{16}$ -inch
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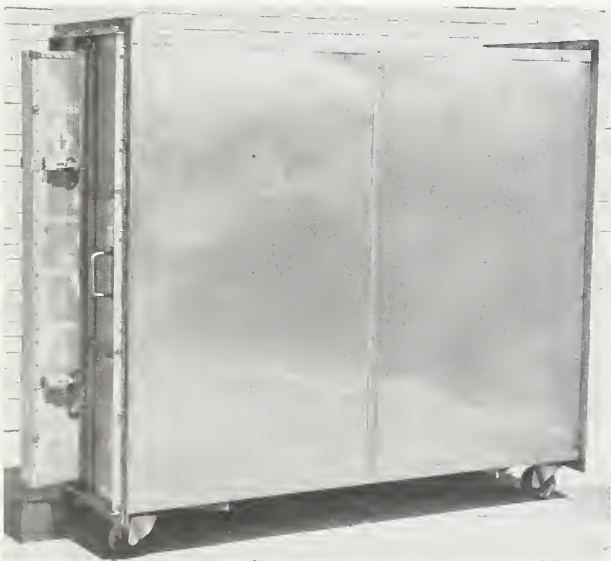


FIGURE 1.—Assembled emergence cabinet.

¹Supervisory agricultural engineer and research entomologist, Boll Weevil Research Laboratory, Science and Education Administration, U.S. Department of Agriculture, P.O. Box 5367, Mississippi State, Miss. 39762.

FIGURE 2.—Side, top, and bottom elevations and details of emergence cabinet. Cross sections A-A and B-B appear in figure 3.

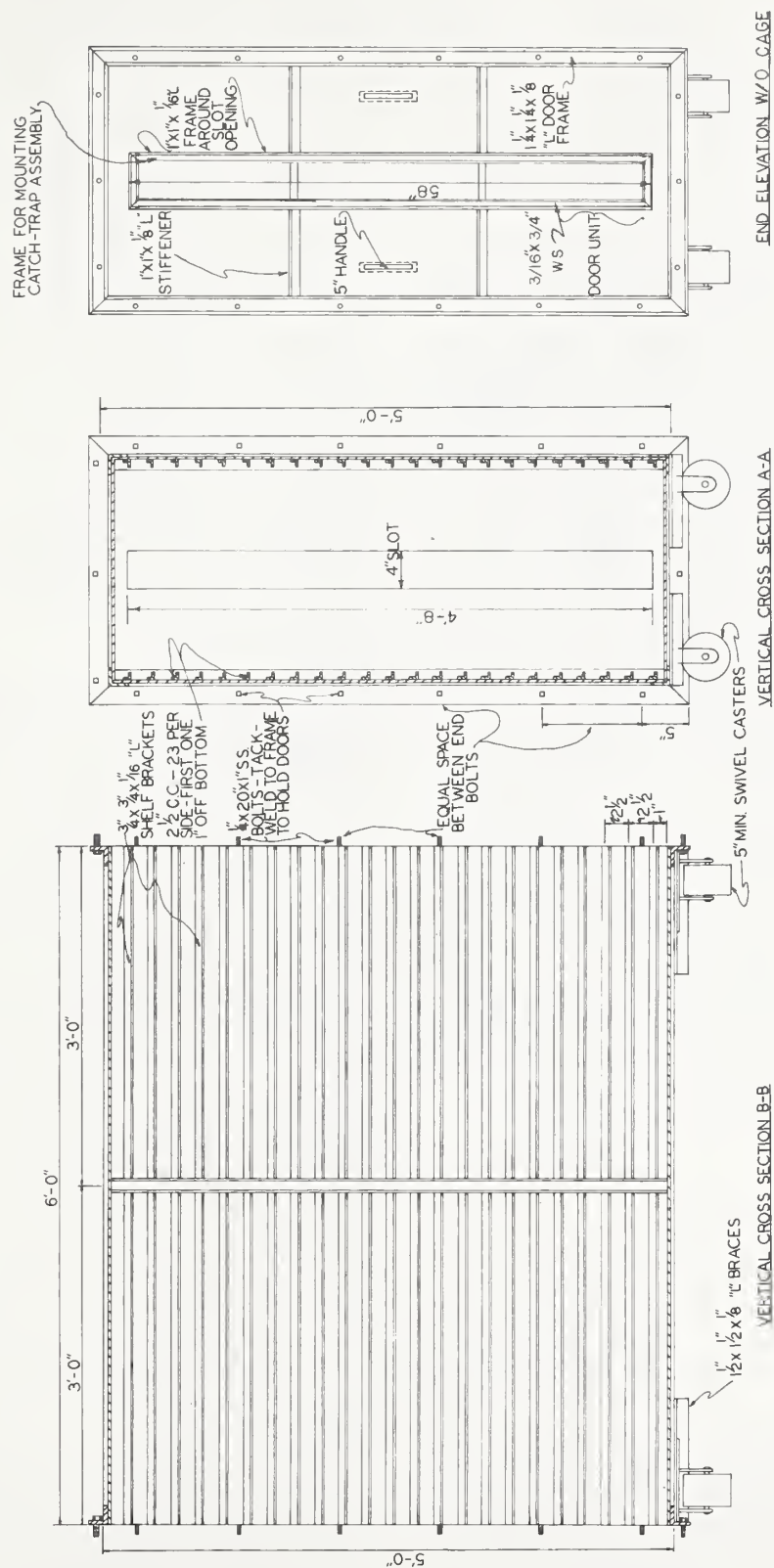


FIGURE 3.—End elevation and details of emergence cabinet.

angle material, are spaced 2½ inches from center to center (C.C.) and are spot-welded to each sidewall of the cabinet to support the tiers of shelf sections. Each shelf, composed of two sections 23½ by 35 inches, is made of sheet metal with a ½-inch "turn up" flange on all sides, forming a ½-inch-deep flat pan. These sections slide on the brackets and are removable for loading, emptying, cleaning, and sanitizing.

Full-width removable doors, each containing a collecting cage, constitute the end walls and are fastened to the cabinet with threaded studs and wing nuts. Each door is made of a metal angle frame covered with 24-gage sheet metal and has a 4-inch-wide slot extending from near the bottom to near the top in the center to provide light and ventilation, and an exit for the emerging weevils. This slot width was the most desirable one found for the size of the cabinet. The removable collecting cage (fig. 4) is fastened snugly over the slot in the door with four toggle latches. The cage has a strip of 16-mesh hardware cloth on each side to allow light and air into the cage and cabinet but to retain the weevils. The shelves are mounted approximately 7 inches from center to center inside the cage to keep the entering weevils separated into small groups, rather than letting them fall to the bottom of the cage in one large group. Strips of neoprene weatherstripping (WS) provide a light- and weevil-proof seal between the doors and the cabinet and also between the cage and the door.

The cabinet is mounted on four 5-inch-diameter swivel casters for ease in moving. All materials except the weatherstripping and casters are stainless steel to withstand the cleaning and sanitizing agents. All joints, seams, and corners of the cabinet are light and weevil proof.

USE

Boll weevils are phototropic. The design of the cabinet allows light to enter only through the wire on the sides of the cage and the slot opening between the interior of the cabinet and the attached cage. The weevils are thus attracted to the collecting cage.

The cabinet dimensions accommodate the two-tray cuts used in the rearing operation. The height allows the shelf sections to be placed in the top brackets by a person of average height, and the length permits good maneuverability but gives

about the maximum capacity that one person can move. The 2½-inch-shelf-bracket spacing is the optimum one found to provide necessary space for the trays and to allow for air movement between the adjoining shelves and around and over the trays of rearing medium. The shelf sections are made solid to reduce the vertical air and moisture movement within the box, thereby providing for more uniform weevil emergence from the top to the bottom of the cabinet.

To fill the cabinet with rearing trays, a shelf section is removed from the cabinet and placed on a worktable. The covers are removed from the rearing trays, and the tray cuts are placed on the shelf section, with some side overlap of adjoining trays. When the shelf section has been filled, it is placed on shelf brackets in the cabinet. Another section is removed, filled with trays, and returned to the cabinet. This procedure is repeated until all the shelf sections have been filled. The doors are put in place on the cabinet and fastened securely with wing nuts, and the cabinet is rolled into the emergence room.

After the adult weevils emerge from the rearing medium, they are attracted by the light entering the slot in the door, and they eventually crawl through the slot and enter the collecting cage. Once each day during the emergence period, the cages are removed from the cabinet, the weevils removed from the cages, and the cages replaced. At the end of the emergence period, the trays of spent rearing medium are removed from the cabinet and discarded. Afterward, the cabinet and cages are cleaned and sanitized.

The cabinet accommodates 920 of the rearing trays used at the Robert T. Gast Rearing Laboratory; this number usually produces 450,000 or more weevils. It could be adapted to hold petri dishes, which are used at some locations. The cabinet can be handled by one person and will pass through a regular-size door opening. A piece of sheet metal can be fastened to the channel members at the center of the cabinet to separate it into two compartments, if desired. Cabinets should be spaced in the emergence room to allow for proper ventilation and moisture removal and to reduce the temperature stratification inside.

Several cabinets were used in two mass-rearing (5 to 6 million weevils per week) production tests extending for 6 to 8 weeks each, and they performed adequately. Fewer cabinets and less labor were needed to produce this number

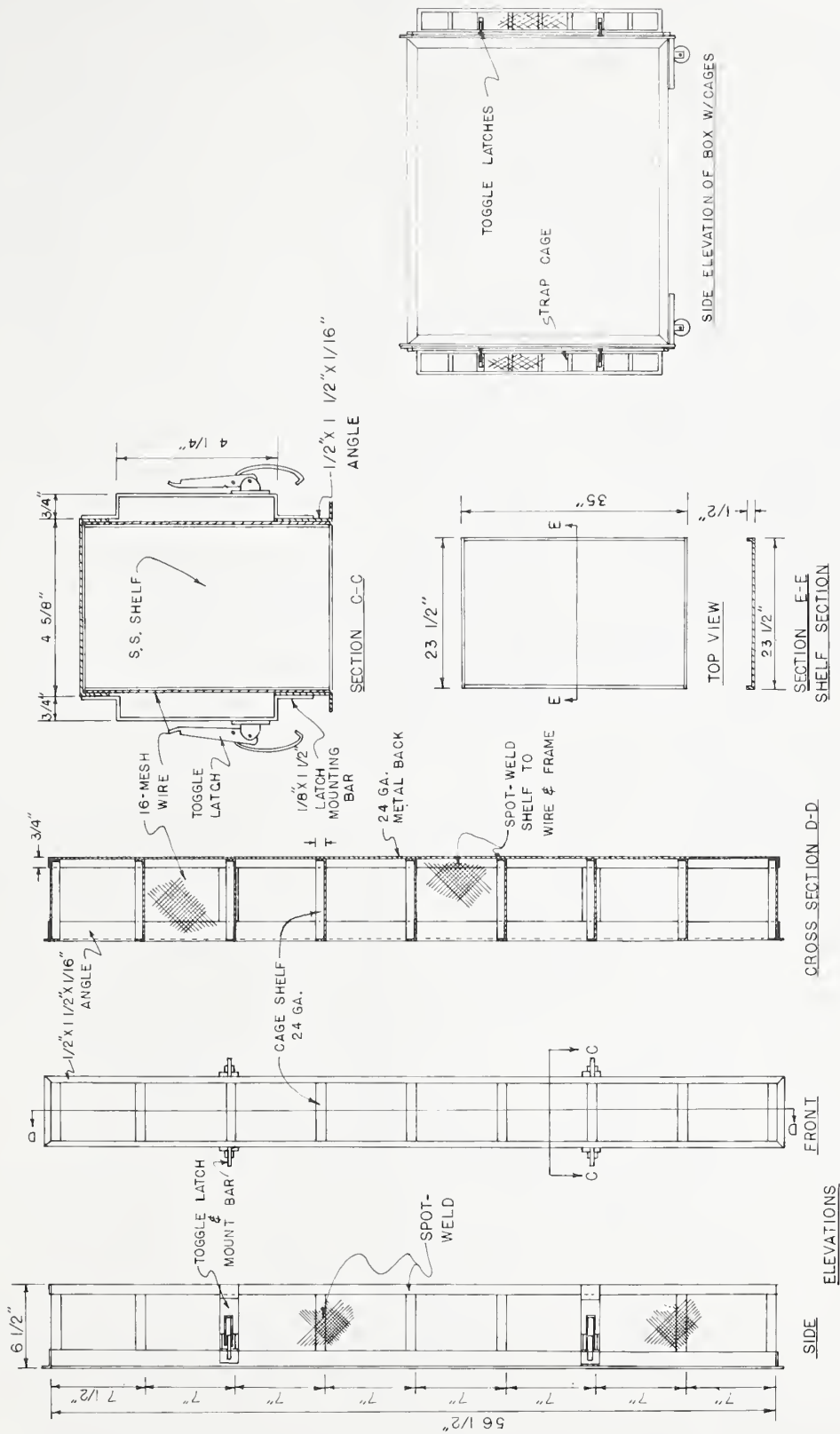


FIGURE 4.—Elevations and details of collecting cage.

of weevils than with the cabinets developed by Gast, and the yield of weevils was as good or better.

Care must be taken in fabrication to prevent warping and cracks between the cage and door and the doors and cabinet. During use, the weatherstripping must be maintained in good repair to prevent weevils from escaping. Finding an adhesive to bond the weatherstripping to the metal for an extended period of time was a

problem. Of the several adhesives tested, 3M #08001 super weatherstrip adhesive gave the most satisfactory performance.

REFERENCE

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